



# Local Government Energy Audit: Energy Audit Report



***Lake Riviera Middle School***

**Brick Township**

**Board of Education**

171 Beaverson Boulevard

Brick, NJ 08723

April 16, 2018

Final Report by:

**TRC Energy Services**



Copyright ©2017 TRC Energy Services. All rights reserved.

Reproduction or distribution of the whole, or any part of the contents of this document without written permission of TRC is prohibited. Neither TRC nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any data, information, method, product or process disclosed in this document, or represents that its use will not infringe upon any privately-owned rights, including but not limited to, patents, trademarks or copyrights.

## Disclaimer

---

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

# Table of Contents

---

<b>1</b>	<b>Executive Summary.....</b>	<b>1</b>
1.1	Facility Summary .....	1
1.2	Your Cost Reduction Opportunities.....	1
	Energy Conservation Measures.....	1
	Energy Efficient Best Practices .....	4
	On-Site Generation Measures.....	4
1.3	Implementation Planning.....	4
<b>2</b>	<b>Facility Information and Existing Conditions .....</b>	<b>6</b>
2.1	Project Contacts .....	6
2.2	General Site Information.....	6
2.3	Building Occupancy .....	6
2.4	Building Envelope .....	6
2.5	On-Site Generation.....	7
2.6	Energy-Using Systems .....	7
	Lighting System .....	7
	Heating, Ventilation, and Air Conditioning (HVAC) .....	8
	Domestic Hot Water Heating System.....	10
	Food Service & Refrigeration .....	10
	Building Plug Load .....	11
2.7	Water-Using Systems .....	11
<b>3</b>	<b>Site Energy Use and Costs.....</b>	<b>12</b>
3.1	Total Cost of Energy .....	12
3.2	Electricity Usage .....	13
3.3	Natural Gas Usage .....	14
3.4	Benchmarking.....	15
3.5	Energy End-Use Breakdown .....	16
<b>4</b>	<b>Energy Conservation Measures .....</b>	<b>17</b>
4.1	Recommended ECMs .....	17
4.1.1	Lighting Upgrades.....	18
	ECM 1: Install LED Fixtures .....	18
	ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers.....	19
	ECM 3: Retrofit Fixtures with LED Lamps.....	19
4.1.2	Lighting Control Measures .....	20
	ECM 4: Install Occupancy Sensor Lighting Controls .....	20
4.1.3	Motor Upgrades .....	21
	ECM 5: Premium Efficiency Motors.....	21
4.1.4	Variable Frequency Drive Measures .....	22
	ECM 6: Install VFDs on Hot Water Pumps.....	22

4.1.5	Gas-Fired Heating System Replacements.....	23
	ECM 7: Install High Efficiency Hot Water Boilers .....	23
4.1.6	Domestic Water Heating Upgrade .....	24
	ECM 8: Install High Efficiency Gas Water Heater .....	24
4.1.7	Plug Load Equipment Control - Vending Machines.....	25
	ECM 9: Vending Machine Control .....	25
4.2	ECMs Evaluated But Not Recommended .....	26
	Install High Efficiency Gas Water Heater.....	26
<b>5</b>	<b>Energy Efficient Best Practices .....</b>	<b>27</b>
	Reduce Air Leakage .....	27
	Close Doors and Windows .....	27
	Ensure Lighting Controls Are Operating Properly .....	27
	Use Fans to Reduce Cooling Load .....	27
	Practice Proper Use of Thermostat Schedules and Temperature Resets .....	27
	Clean Evaporator/Condenser Coils on AC Systems .....	28
	Perform Proper Boiler Maintenance .....	28
	Perform Proper Water Heater Maintenance .....	28
	Plug Load Controls.....	28
	Replace Computer Monitors .....	28
	Water Conservation .....	29
<b>6</b>	<b>On-Site Generation Measures .....</b>	<b>30</b>
6.1	Photovoltaic.....	30
<b>7</b>	<b>Demand Response .....</b>	<b>32</b>
<b>8</b>	<b>Project Funding / Incentives .....</b>	<b>33</b>
8.1	SmartStart .....	34
8.2	Pay for Performance - Existing Buildings.....	35
8.3	Energy Savings Improvement Program .....	36
8.4	Demand Response Energy Aggregator.....	37
<b>9</b>	<b>Energy Purchasing and Procurement Strategies .....</b>	<b>38</b>
9.1	Retail Electric Supply Options.....	38
9.2	Retail Natural Gas Supply Options .....	38

Appendix A: Equipment Inventory & Recommendations

Appendix B: ENERGY STAR® Statement of Energy Performance

# Table of Figures

---

Figure 1 – Previous 12 Month Utility Costs.....	2
Figure 2 – Potential Post-Implementation Costs .....	2
Figure 3 – Summary of Energy Reduction Opportunities .....	3
Figure 4 – Project Contacts .....	6
Figure 5 - Building Schedule.....	6
Figure 6 - Utility Summary .....	12
Figure 7 - Energy Cost Breakdown .....	12
Figure 8 - Electric Usage & Demand.....	13
Figure 9 - Electric Usage & Demand.....	13
Figure 10 - Natural Gas Usage.....	14
Figure 11 - Natural Gas Usage.....	14
Figure 12 - Energy Use Intensity Comparison – Existing Conditions.....	15
Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures .....	15
Figure 14 - Energy Balance (% and kBtu/SF) .....	16
Figure 15 – Summary of Recommended ECMs.....	17
Figure 16 – Summary of Lighting Upgrade ECMs.....	18
Figure 17 – Summary of Lighting Control ECMs .....	20
Figure 18 – Summary of Motor Upgrade ECMs .....	21
Figure 19 – Summary of Variable Frequency Drive ECMs .....	22
Figure 20 - Summary of Gas-Fired Heating Replacement ECMs.....	23
Figure 21-Summary of Domestic Water Heater ECMs .....	24
Figure 22-- Summary of Plug Load Equipment Control ECMs .....	25
Figure 23 – Summary of Measures Evaluated, But Not Recommended .....	26
Figure 24 - ECM Incentive Program Eligibility.....	33

# I EXECUTIVE SUMMARY

---

The New Jersey Board of Public Utilities (NJBPUB) has sponsored this Local Government Energy Audit (LGEA) Report for Lake Riviera Middle School.

The goal of an LGEA report is to provide local governments with valuable information on their facilities' energy usage, to identify energy conservation measures (ECMs) and energy management options that may benefit their facilities, and to provide information on financial incentives from New Jersey's Clean Energy Programs (NJCEP) and other sources which may be available to assist with ECM implementation.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing energy usage statewide.

## I.1 Facility Summary

Lake Riviera Middle School is a 129,208 square foot public school in Brick Township, New Jersey. The building has two stories. It was constructed in 1966 with additions constructed in 1996 and 2002. It is comprised of classrooms, administrative offices, a cafeteria, a gymnasium, a large multi-purpose room, storage areas, and restrooms.

The interior of the building is mostly lit by 4-foot T8 linear fluorescent fixtures, with 2 or 4 lamps. There are also a few older lighting technologies, such as T12 fluorescents and incandescents bulbs. Lighting is controlled throughout the building only by manual wall switches. Exterior lighting is comprised mostly of high intensity discharge (HID) area lighting fixtures and some compact fluorescents that light the doorways. However, a few wall-mounted perimeter light fixtures and some pole mounted lights in the parking lot have recently been upgraded with new high efficiency LEDs. Exterior lighting is controlled by timers.

The main building is heated by two large Superior gas-fired boilers. They are over 50 years old and each has an input capacity of 6,695 MBh. There are two small 150-MBh Slant Fin boilers in the 1996 section and one Hydrotherm 900 MBh boiler in the 2002 section.

Two AAON gas/electric rooftop units (an 8-ton and a 15-ton RTU) supply supplemental heating and cooling to the multipurpose room and cafeteria areas. Only 35% of the building has air conditioning. Besides the two RTUs, the only other cooling is provided by 12 window AC units and 10 ductless mini-split systems – each providing between 1 and 3 tons of cooling to classroom and office areas.

A thorough description of the facility and our observations are located in Section 2.

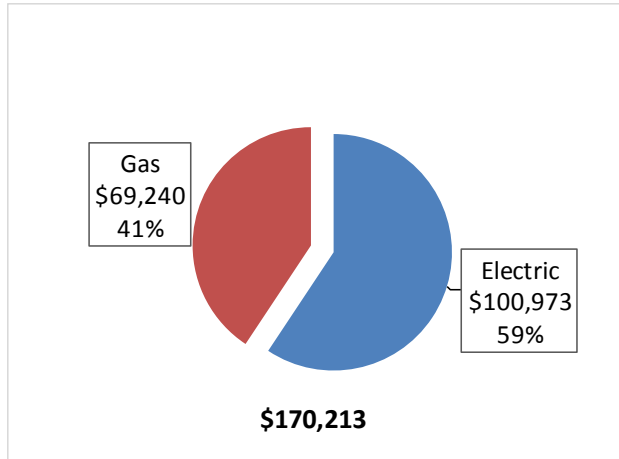
## I.2 Your Cost Reduction Opportunities

### Energy Conservation Measures

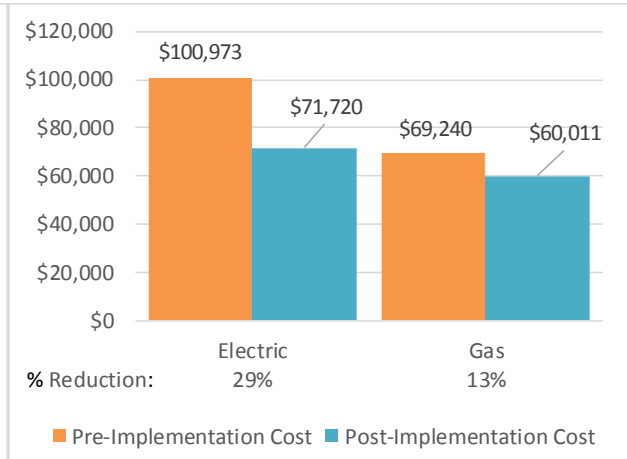
TRC evaluated nine energy conservation measures. Eight ECMs are considered “high priority” measures, which means that they would likely pay for themselves in energy savings alone over the rated useful lifetime of the equipment. These eight measures together represent an opportunity for Lake Riviera Middle School to reduce its annual energy costs by \$38,482 and annual greenhouse gas emissions by 363,248 lbs CO<sub>2</sub>e. We estimate that if all measures are implemented as recommended in this report, then the project would likely pay for itself in roughly 8.4 years. A breakdown of the facility's current utility costs and an estimate of potential annual utility savings are shown in Figure 1 and Figure 2, respectively.

Together these measures represent an opportunity to reduce Lake Riviera Middle School’s annual energy use by about 18% overall.

**Figure 1 – Previous 12 Month Utility Costs**



**Figure 2 – Potential Post-Implementation Costs**



A detailed description of Lake Riviera Middle School’s existing energy usage can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A measure to replace one of the school’s domestic hot water heaters with a higher efficiency model was evaluated, but not included among the high priority measure, because the measure’s payback period was deemed to be too long compared to the rated useful lifetime of such equipment. Cost and savings for that measures are shown below, even though it a lower priority or optional measure.

A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.



Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>164,964</b>	<b>38.5</b>	<b>0.0</b>	<b>\$19,130.84</b>	<b>\$109,358.97</b>	<b>\$19,800.00</b>	<b>\$89,558.97</b>	<b>4.7</b>	<b>166,117</b>
ECM 1	Install LED Fixtures	23,295	3.4	0.0	\$2,701.54	\$10,930.67	\$3,900.00	\$7,030.67	2.6	23,458
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	14,855	3.0	0.0	\$1,722.70	\$16,171.00	\$950.00	\$15,221.00	8.8	14,959
ECM 3	Retrofit Fixtures with LED Lamps	126,814	32.1	0.0	\$14,706.60	\$82,257.31	\$14,950.00	\$67,307.31	4.6	127,700
<b>Lighting Control Measures</b>		<b>34,320</b>	<b>8.5</b>	<b>0.0</b>	<b>\$3,980.05</b>	<b>\$30,294.00</b>	<b>\$3,965.00</b>	<b>\$26,329.00</b>	<b>6.6</b>	<b>34,560</b>
ECM 4	Install Occupancy Sensor Lighting Controls	34,320	8.5	0.0	\$3,980.05	\$30,294.00	\$3,965.00	\$26,329.00	6.6	34,560
<b>Motor Upgrades</b>		<b>4,833</b>	<b>1.1</b>	<b>0.0</b>	<b>\$560.54</b>	<b>\$5,441.93</b>	<b>\$0.00</b>	<b>\$5,441.93</b>	<b>9.7</b>	<b>4,867</b>
ECM 5	Premium Efficiency Motors	4,833	1.1	0.0	\$560.54	\$5,441.93	\$0.00	\$5,441.93	9.7	4,867
<b>Variable Frequency Drive (VFD) Measures</b>		<b>44,219</b>	<b>4.5</b>	<b>0.0</b>	<b>\$5,128.06</b>	<b>\$16,393.60</b>	<b>\$0.00</b>	<b>\$16,393.60</b>	<b>3.2</b>	<b>44,528</b>
ECM 6	Install VFDs on Hot Water Pumps	44,219	4.5	0.0	\$5,128.06	\$16,393.60	\$0.00	\$16,393.60	3.2	44,528
<b>Gas Heating (HVAC/Process) Replacement</b>		<b>0</b>	<b>0.0</b>	<b>933.0</b>	<b>\$9,229.63</b>	<b>\$184,109.73</b>	<b>\$0.00</b>	<b>\$184,109.73</b>	<b>19.9</b>	<b>109,240</b>
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	933.0	\$9,229.63	\$184,109.73	\$0.00	\$184,109.73	19.9	109,240
<b>Domestic Water Heating Upgrade</b>		<b>0</b>	<b>0.0</b>	<b>65.7</b>	<b>\$649.79</b>	<b>\$11,500.21</b>	<b>\$398.00</b>	<b>\$11,102.21</b>	<b>17.1</b>	<b>7,691</b>
	Install High Efficiency Gas Water Heater	0	0.0	65.7	\$649.79	\$11,500.21	\$398.00	\$11,102.21	17.1	7,691
<b>Plug Load Equipment Control - Vending Machine</b>		<b>3,909</b>	<b>0.0</b>	<b>0.0</b>	<b>\$453.29</b>	<b>\$920.00</b>	<b>\$0.00</b>	<b>\$920.00</b>	<b>2.0</b>	<b>3,936</b>
ECM 8	Vending Machine Control	3,909	0.0	0.0	\$453.29	\$920.00	\$0.00	\$920.00	2.0	3,936
<b>TOTAL FOR PROPOSED MEASURES</b>		<b>252,244</b>	<b>52.6</b>	<b>933.0</b>	<b>\$38,482.42</b>	<b>\$346,518.23</b>	<b>\$23,765.00</b>	<b>\$322,753.23</b>	<b>8.4</b>	<b>363,248</b>
<b>TOTAL FOR ALL MEASURES</b>		<b>252,244</b>	<b>52.6</b>	<b>998.7</b>	<b>\$39,132.21</b>	<b>\$358,018.44</b>	<b>\$24,163.00</b>	<b>\$333,855.44</b>	<b>8.5</b>	<b>370,939</b>

\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

**Lighting Upgrades** generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measure save energy by reducing the power used by the lighting components due to improved electrical efficiency.

**Lighting Controls** measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

**Motor Upgrades** generally involve replacing older standard efficiency motors with high efficiency standard (IHP 2014). Motors replacements generally assume the same size motors, just higher efficiency. Although occasionally additional savings can be achieved by downsizing motors to better meet current load requirements. This measure saves energy by reducing the power used by the motors, due to improved electrical efficiency.

**Variable Frequency Drives (VFDs)** are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient than using a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

**Gas Heating (HVAC/Process)** measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

**Domestic Hot Water** upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

**Plug Load Equipment** control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlets when not in use.



## **Energy Efficient Best Practices**

TRC also identified 11 low cost (or no cost) energy efficient best practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These best practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. It is our understanding Brick Township Board of Education is already implementing many of the best practices described in the audit reports, however they are listed for representative purposes only.

- Reduce Air Leakage
- Close Doors and Windows
- Ensure Lighting Controls Are Operating Properly
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean Evaporator/Condenser Coils on AC Systems
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

For details on these energy efficient best practices, please refer to Section 5.

## **On-Site Generation Measures**

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 329 kW PV solar array at Lake Riviera Middle School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years.

Installation of the solar array at Lake Riviera Middle School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun. Because an agreement for solar development of the site was already in place, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

For further details the building's on-site generation potential, please see Section 6.

## **1.3 Implementation Planning**

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Pay for Performance - Existing Building
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

Larger facilities with an interest in a more comprehensive whole building approach to energy conservation should consider participating in the Pay for Performance (P4P) program. Projects eligible for this project program must meet minimum savings requirements. Final incentives are calculated based on actual measured performance achieved at the end of the project. The application process is more involved, and it requires working with a qualified P4P contractor, but the process may result in greater energy savings overall and more lucrative incentives, up to 50% of project's total cost.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

Additional information on relevant incentive programs is located in Section 8 or: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci).

## 2 FACILITY INFORMATION AND EXISTING CONDITIONS

### 2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
<b>Customer</b>			
Will Kolibas	Exec Director of Facilities	wkolibas@brickschools.org	(732) 785-3000
James W. Edwards	Business Administrator	jedwards@brickschools.org	(732) 785-3000
<b>TRC Energy Services</b>			
Tom Page	Auditor	tpage@TRCsolutions.com	(732) 855-0033

### 2.2 General Site Information

On March 1, 2017, TRC performed an energy audit at Lake Riviera Middle School located in Brick, New Jersey. TRC’s team met with Will Kolibas to review the facility operations and help focus our investigation on specific energy-using systems.

Lake Riviera Middle School is a 129,208 square foot public school in Brick Township, New Jersey. The building has two-stories. It was constructed in 1966 with additions constructed in 1996 and 2002. It is comprised of classrooms, administrative offices, a cafeteria, a gymnasium, a large multi-purpose room, storage areas, and restrooms.

### 2.3 Building Occupancy

The building is typically occupied from 8:00 AM to 4:00 PM, Monday through Friday, by approximately 145 staff and about 957 students. It is typically closed on the weekends and during the summer months.

Figure 5 - Building Schedule

Building Occupancy Schedule		
Building Name	Weekday/Weekend	Operating Schedule
Lake Riviera Middle School	Weekday	8 am - 4 pm
Lake Riviera Middle School	Weekend	Closed

### 2.4 Building Envelope

The building is a slab on grade construction with concrete masonry block walls. It has a flat roof covered with a light colored thermoplastic membrane. Windows are all double-paned aluminum frame hopper type. All door and window seals appeared tight. No excessive air infiltration was observed.



## 2.5 On-Site Generation

Lake Riviera Middle School is one of the schools that was included in a solar PPA that the Brick Township BOE signed with GeoPeak Energy, LLC in October 2015. According to the terms of the PPA, 329 kW solar array is planned to be installed on the building's rooftop in 2017 and at other Brick Township public school buildings. At the time of our inspection, installation was on-going at Lake Riviera Middle School.

*Image 1: Rooftop Solar PV Array Under Construction at LRMS*



## 2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

### Lighting System

The interior of the building is mostly lit by 4-foot T8 linear fluorescent fixtures, with 2 or 4 lamps. There are also a few older lighting technologies, such as T12 fluorescents and incandescent bulbs. Lighting is controlled throughout the building only by manual wall switches. Exterior lighting is comprised mostly of high intensity discharge (HID) area lighting fixtures and some compact fluorescents that light the doorways. However, a few wall-mounted perimeter light fixtures and some pole mounted lights in the parking lot have recently been upgraded with new high efficiency LEDs. Exterior lighting is controlled by timers.

Image 2: Interior & Exterior Light Fixtures



## **Heating, Ventilation, and Air Conditioning (HVAC)**

The building is primarily heated by two large Superior gas-fired boilers. They are both over 50 years old, well beyond their rated useful lifetime. They each have an input capacity of 6,695 MBh. They are estimated to be about 75% efficient and are in fair condition. The 1996 addition is heated by two small 150-MBh Slant Fin boilers. These boilers are scheduled for replacement. New Utica brand boilers were onsite, but not yet installed. A 900 MBh Hydrotherm boiler system provides heating to the 2002 addition.

Heating hot water (HHW) pumps in each section distribute hot water to unit ventilators and baseboard heaters. There are two 15 hp, one 5 hp, and two 1 hp HHW pumps. Unit ventilators throughout the building have pneumatic controls.

There are two AAON gas/electric rooftop units (RTU) which supply supplemental heating and cooling to the multipurpose room, cafeteria, and adjacent areas. The RTU on the roof above the multipurpose room has 8 tons of cooling capacity and 180 MBh input heating capacity. The one above the cafeteria is 15 ton unit with a 270 MBh input heating capacity. Both RTU furnaces are 81% efficient.



Only 35% of the building has air conditioning. Besides the two RTUs, the only other cooling in the building is provided by 12 small window AC units and 10 ductless mini-split systems. They each provide between 1 and 3 tons of cooling to classroom and office areas.

The building has 24 rooftop exhaust fans, including five in the gym and four in the cafeteria/kitchen area. Most have motors less than 1 hp. There are also exhaust hoods in the kitchen and in the woodshop, which run only a few hours per day, as needed.

*Image 3: Building Boiler Systems*



*Image 4: Heating hot water pumps distribute hot water to unit ventilators*



*Image 5: Ductless Mini-Splits & Window AC Units provide most of the cooling to the building*



## Domestic Hot Water Heating System

Most of the building receives hot water from a single 100 gallon A.O. Smith water heater located in the main boiler room. It is estimated to be about 80% efficient. There is also one high efficiency 100 gallon A.O. Smith water heater, located in Boiler Room #3, which supplies hot water to the 2002 addition of the building. It is rated at about 95% efficiency.

## Food Service & Refrigeration

The kitchen has a large gas stove, a gas oven, and an electric kettle for cooking and re-heating food. There is also one walk-in cooler, one walk-in freezer, plus five cabinet coolers and freezers for storing food for school lunches.

There are four medium refrigerators and four mini-refrigerators in other parts of the building.

*Image 6: Building Refrigeration Units*



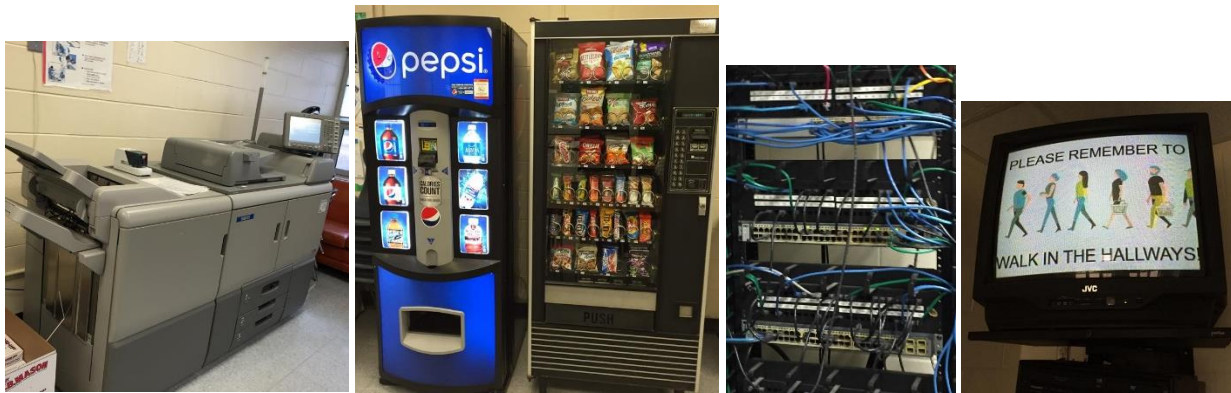


## **Building Plug Load**

We counted 161 desk computers and monitors throughout the school. There also approximately: 12 printers, five large Savin copiers, two server racks, four vending machines, and other typical classroom and office equipment.

Each classroom has a medium-sized television which is used to display school announcements. Most of these are older CRT type televisions. There are about 51 of them. Though not included as an ECM, due to the long payback period, modern flat screen LCD TVs use considerable less energy than older models. Since, the TVs are often on all day long, the school system should consider replacing them with modern ENERGY STAR® rated LCD flat screen TVs to reduce their daily electric demand.

*Image 7: Building Plug Load Equipment*



## **2.7 Water-Using Systems**

There are 21 restrooms in the facility. We checked the fixtures for a representative sample of them. The restroom fixtures were found to meet current federal guidelines for water conserving low-flow devices (restroom faucets were found to be 2.2 gallon per minute (gpm) or less, toilets were found to be 2.5 gallons per flush (gpf) or less, and urinals were found to be 2.0 gpf or less).

### 3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the “typical” energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

#### 3.1 Total Cost of Energy

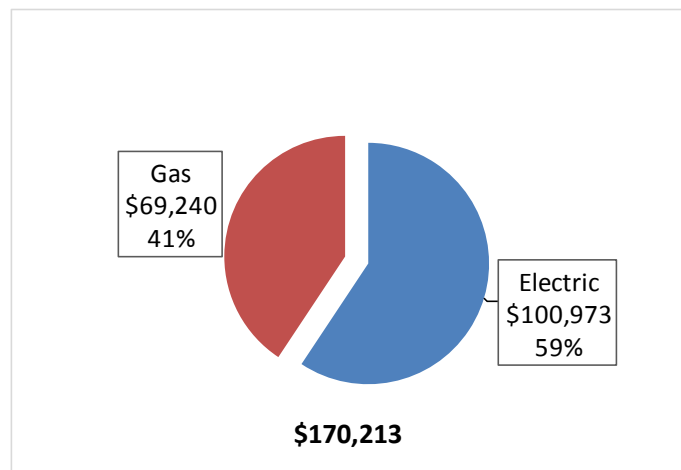
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 6 - Utility Summary*

Utility Summary for Lake Riviera Middle School		
Fuel	Usage	Cost
Electricity	870,679 kWh	\$100,973
Natural Gas	69,992 Therms	\$69,240
<b>Total</b>		<b>\$170,213</b>

The current annual energy cost for this facility is \$170,213 as shown in the chart below.

*Figure 7 - Energy Cost Breakdown*



### 3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over a recent 12-month period was found to be \$0.116/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

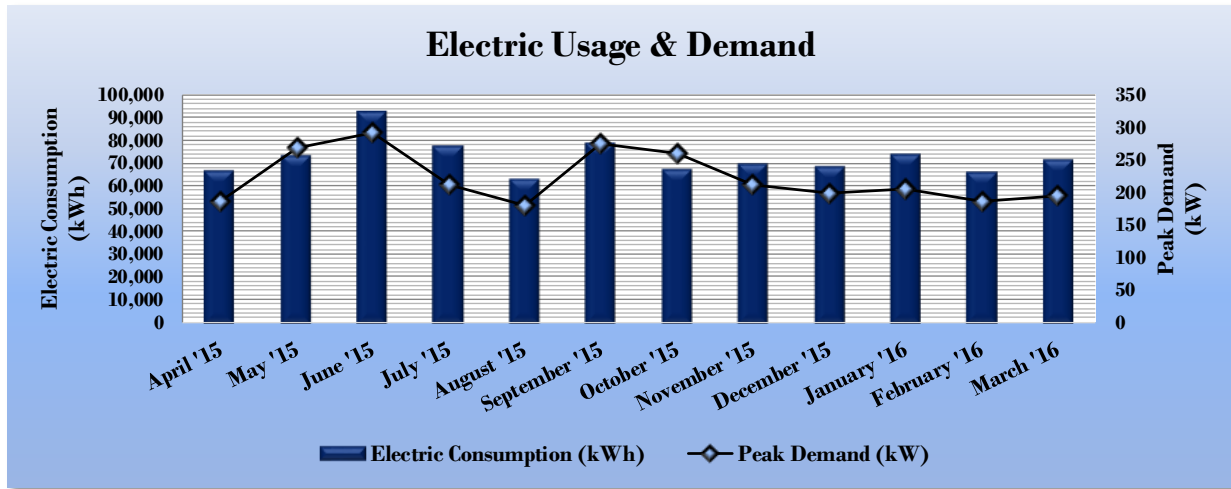


Figure 9 - Electric Usage & Demand

Electric Billing Data for Lake Riviera Middle School					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
4/16/15	31	66,806	186	\$7,617	No
5/14/15	28	73,601	269	\$8,724	No
6/15/15	32	93,171	292	\$10,884	No
7/16/15	31	78,127	211	\$9,127	Yes
8/14/15	29	63,120	180	\$7,270	No
9/16/15	33	78,786	274	\$9,375	No
10/15/15	29	67,516	261	\$8,090	No
11/16/15	30	70,267	211	\$8,084	No
12/14/15	30	69,085	199	\$7,904	No
1/18/16	35	74,319	205	\$8,450	No
2/16/16	29	66,305	187	\$7,563	No
3/16/16	29	71,961	194	\$8,162	No
<b>Totals</b>	<b>366</b>	<b>873,064</b>	<b>291.6</b>	<b>\$101,249</b>	
<b>Annual</b>	<b>365</b>	<b>870,679</b>	<b>291.6</b>	<b>\$100,973</b>	

### 3.3 Natural Gas Usage

Natural Gas is provided by NJ Natural Gas. The average gas cost over a recent 12-month period was found to be \$0.989/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 10 - Natural Gas Usage

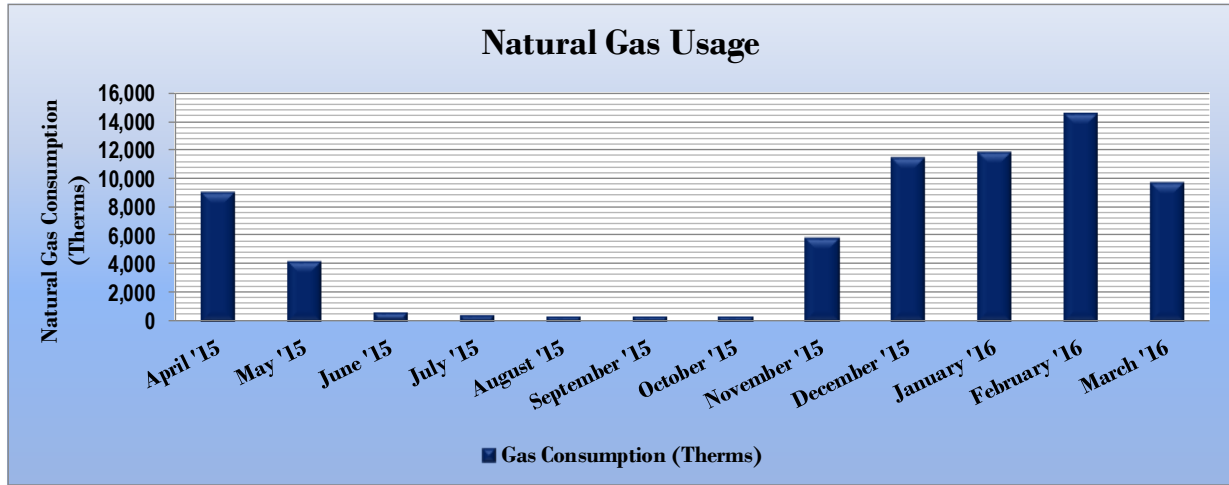


Figure 11 - Natural Gas Usage

Gas Billing Data for Lake Riviera Middle School			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/15/15	28	9,052	\$8,524
5/14/15	29	4,233	\$4,534
6/16/15	33	711	\$1,593
7/18/15	32	539	\$1,465
8/13/15	26	388	\$1,137
9/14/15	32	391	\$1,345
10/14/15	30	433	\$1,373
11/11/15	28	5,893	\$5,674
12/22/15	41	11,489	\$10,546
1/19/16	28	11,895	\$10,528
2/17/16	29	14,624	\$12,954
3/14/16	26	9,768	\$8,999
<b>Totals</b>	<b>362</b>	<b>69,417</b>	<b>\$68,671</b>
<b>Annual</b>	<b>365</b>	<b>69,992</b>	<b>\$69,240</b>

### 3.4 Benchmarking

This facility was benchmarked using Portfolio Manager, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager analyzes your building’s consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility’s energy consumption per square foot, and it is the standard metric for comparing buildings’ energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of “site energy” and “source energy.” Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

**Figure 12 - Energy Use Intensity Comparison – Existing Conditions**

Energy Use Intensity Comparison - Existing Conditions		
	Lake Riviera Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	129.1	141.4
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	77.2	58.2

Implementation of all recommended measures in this report would improve the building’s estimated EUI significantly, as shown in the table below:

**Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures**

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Lake Riviera Middle School	National Median Building Type: School (K-12)
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	100.6	141.4
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	63.3	58.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is one of the building categories that are eligible to receive a score. This facility has a current score of 30, which means that it uses significantly more energy per square foot than an average school of similar size, age, and occupancy. Installation of the ECMs described in this report for example, upgrading the aging boilers, replacing light fixtures, and adding controls to turn lights off in unoccupied areas and will likely improve the school’s score significantly.

A Portfolio Manager Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

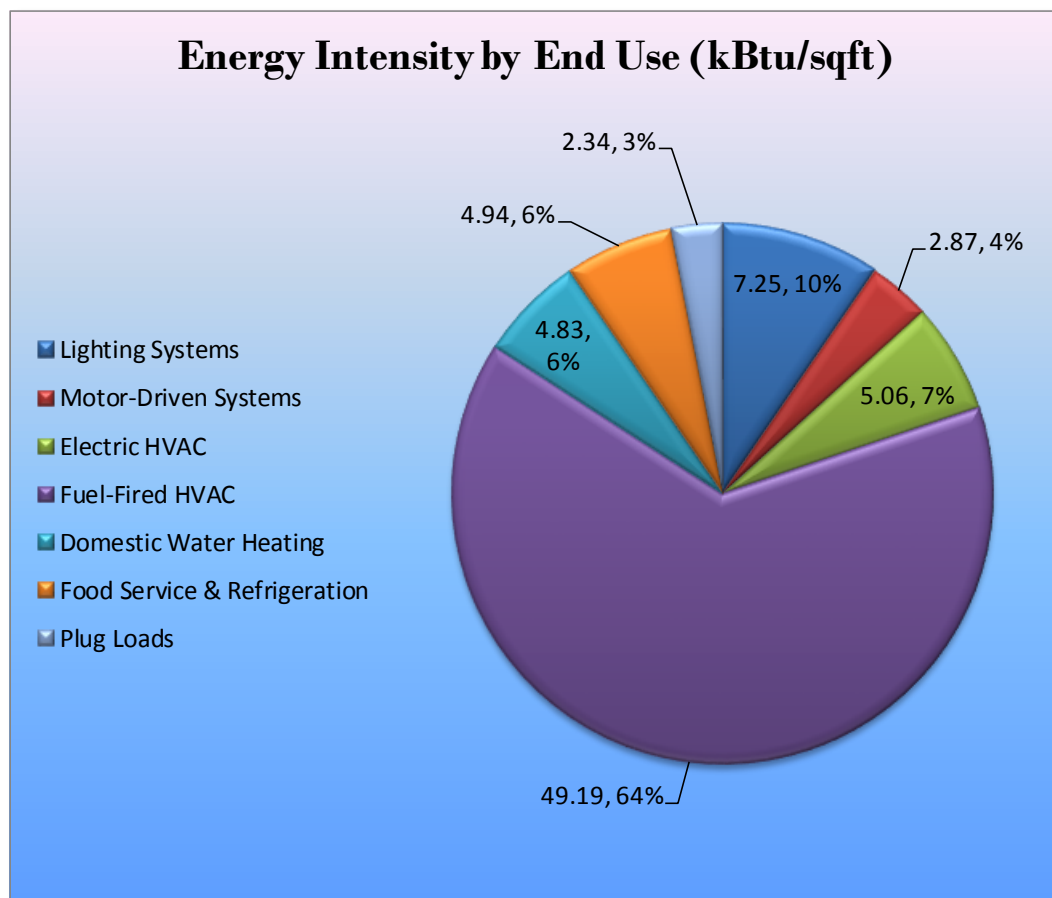
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

A Portfolio Manager account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager regularly, so that you can keep track of your building’s performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager to track your building’s performance at: <https://www.energystar.gov/buildings/training>.

### 3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 14 - Energy Balance (% and kBtu/SF)



## 4 ENERGY CONSERVATION MEASURES

### Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Lake Riviera Middle School regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

### 4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>164,964</b>	<b>38.5</b>	<b>0.0</b>	<b>\$19,130.84</b>	<b>\$109,358.97</b>	<b>\$19,800.00</b>	<b>\$89,558.97</b>	<b>4.7</b>	<b>166,117</b>
ECM 1	Install LED Fixtures	23,295	3.4	0.0	\$2,701.54	\$10,930.67	\$3,900.00	\$7,030.67	2.6	23,458
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	14,855	3.0	0.0	\$1,722.70	\$16,171.00	\$950.00	\$15,221.00	8.8	14,959
ECM 3	Retrofit Fixtures with LED Lamps	126,814	32.1	0.0	\$14,706.60	\$82,257.31	\$14,950.00	\$67,307.31	4.6	127,700
<b>Lighting Control Measures</b>		<b>34,320</b>	<b>8.5</b>	<b>0.0</b>	<b>\$3,980.05</b>	<b>\$30,294.00</b>	<b>\$3,965.00</b>	<b>\$26,329.00</b>	<b>6.6</b>	<b>34,560</b>
ECM 4	Install Occupancy Sensor Lighting Controls	34,320	8.5	0.0	\$3,980.05	\$30,294.00	\$3,965.00	\$26,329.00	6.6	34,560
<b>Motor Upgrades</b>		<b>4,833</b>	<b>1.1</b>	<b>0.0</b>	<b>\$560.54</b>	<b>\$5,441.93</b>	<b>\$0.00</b>	<b>\$5,441.93</b>	<b>9.7</b>	<b>4,867</b>
ECM 5	Premium Efficiency Motors	4,833	1.1	0.0	\$560.54	\$5,441.93	\$0.00	\$5,441.93	9.7	4,867
<b>Variable Frequency Drive (VFD) Measures</b>		<b>44,219</b>	<b>4.5</b>	<b>0.0</b>	<b>\$5,128.06</b>	<b>\$16,393.60</b>	<b>\$0.00</b>	<b>\$16,393.60</b>	<b>3.2</b>	<b>44,528</b>
ECM 6	Install VFDs on Hot Water Pumps	44,219	4.5	0.0	\$5,128.06	\$16,393.60	\$0.00	\$16,393.60	3.2	44,528
<b>Gas Heating (HVAC/Process) Replacement</b>		<b>0</b>	<b>0.0</b>	<b>933.0</b>	<b>\$9,229.63</b>	<b>\$184,109.73</b>	<b>\$0.00</b>	<b>\$184,109.73</b>	<b>19.9</b>	<b>109,240</b>
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	933.0	\$9,229.63	\$184,109.73	\$0.00	\$184,109.73	19.9	109,240
<b>Plug Load Equipment Control - Vending Machine</b>		<b>3,909</b>	<b>0.0</b>	<b>0.0</b>	<b>\$453.29</b>	<b>\$920.00</b>	<b>\$0.00</b>	<b>\$920.00</b>	<b>2.0</b>	<b>3,936</b>
ECM 8	Vending Machine Control	3,909	0.0	0.0	\$453.29	\$920.00	\$0.00	\$920.00	2.0	3,936
<b>TOTALS</b>		<b>252,244</b>	<b>52.6</b>	<b>933.0</b>	<b>\$38,482.42</b>	<b>\$346,518.23</b>	<b>\$23,765.00</b>	<b>\$322,753.23</b>	<b>8.4</b>	<b>363,248</b>

\* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

\*\* - Simple Payback Period is based on net measure costs (i.e. after incentives).



## 4.1.1 Lighting Upgrades

Recommended upgrades to existing lighting fixtures are summarized in Figure 16 below.

**Figure 16 – Summary of Lighting Upgrade ECMs**

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Reduction (lbs)
<b>Lighting Upgrades</b>		<b>164,964</b>	<b>38.5</b>	<b>0.0</b>	<b>\$19,130.84</b>	<b>\$109,358.97</b>	<b>\$19,800.00</b>	<b>\$89,558.97</b>	<b>4.7</b>	<b>166,117</b>
ECM 1	Install LED Fixtures	23,295	3.4	0.0	\$2,701.54	\$10,930.67	\$3,900.00	\$7,030.67	2.6	23,458
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	14,855	3.0	0.0	\$1,722.70	\$16,171.00	\$950.00	\$15,221.00	8.8	14,959
ECM 3	Retrofit Fixtures with LED Lamps	126,814	32.1	0.0	\$14,706.60	\$82,257.31	\$14,950.00	\$67,307.31	4.6	127,700

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

### **ECM 1: Install LED Fixtures**

#### *Summary of Measure Economics*

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
Interior	8,501	1.4	0.0	\$985.92	\$5,468.72	\$2,400.00	\$3,068.72	3.1	8,561
Exterior	14,794	1.9	0.0	\$1,715.62	\$5,461.95	\$1,500.00	\$3,961.95	2.3	14,897

#### *Measure Description*

We recommend replacing existing fixtures containing HID lamps (on exterior walls and in the Multi-Purpose Room) with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

## **ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers**

### *Summary of Measure Economics*

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
Interior	14,855	3.0	0.0	\$1,722.70	\$16,171.00	\$950.00	\$15,221.00	8.8	14,959
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

### *Measure Description*

We recommend retrofitting older T12 fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers, which are designed to be used in retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes.

## **ECM 3: Retrofit Fixtures with LED Lamps**

### *Summary of Measure Economics*

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
Interior	126,653	32.1	0.0	\$14,687.91	\$82,150.31	\$14,950.00	\$67,200.31	4.6	127,538
Exterior	161	0.0	0.0	\$18.69	\$107.00	\$0.00	\$107.00	5.7	162

### *Measure Description*

We recommend retrofitting existing T8 fluorescent fixtures and most other lighting technologies with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

## 4.1.2 Lighting Control Measures

Figure 17 – Summary of Lighting Control ECMs

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>	<b>34,320</b>	<b>8.5</b>	<b>0.0</b>	<b>\$3,980.05</b>	<b>\$30,294.00</b>	<b>\$3,965.00</b>	<b>\$26,329.00</b>	<b>6.6</b>	<b>34,560</b>
ECM 4   Install Occupancy Sensor Lighting Controls	34,320	8.5	0.0	\$3,980.05	\$30,294.00	\$3,965.00	\$26,329.00	6.6	34,560

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

### ECM 4: Install Occupancy Sensor Lighting Controls

#### Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
34,320	8.5	0.0	\$3,980.05	\$30,294.00	\$3,965.00	\$26,329.00	6.6	34,560

#### Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, storage rooms, classrooms, offices areas, gyms, and cafeterias. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

### 4.1.3 Motor Upgrades

Our recommendations for motor upgrade measures are summarized in Figure 18 below.

**Figure 18 – Summary of Motor Upgrade ECMs**

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Motor Upgrades</b>	<b>4,701</b>	<b>1.1</b>	<b>0.0</b>	<b>\$545.20</b>	<b>\$5,441.93</b>	<b>\$0.00</b>	<b>\$5,441.93</b>	<b>10.0</b>	<b>4,734</b>
ECM 5   Premium Efficiency Motors	4,701	1.1	0.0	\$545.20	\$5,441.93	\$0.00	\$5,441.93	10.0	4,734

#### **ECM 5: Premium Efficiency Motors**

##### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
4,701	1.1	0.0	\$545.20	\$5,441.93	\$0.00	\$5,441.93	10.0	4,734

##### *Measure Description*

We recommend replacing standard efficiency motors for the space heating water pumps with IHP 2014 efficiency motors. Our evaluation assumes that existing motors will be replaced with motors of equivalent size and type. Although occasionally additional savings can be achieved by downsizing motors to better meet the motor’s current load requirements. The base case motor efficiencies are estimated from nameplate information and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the *New Jersey’s Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours.

It is generally recommended to replace older motors with new high efficiency models wherever possible when new variable frequency drive controls are proposed to be added (see ECM 6 below).

#### 4.1.4 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 19 below.

*Figure 19 – Summary of Variable Frequency Drive ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Variable Frequency Drive (VFD) Measures</b>		<b>42,557</b>	<b>4.5</b>	<b>0.0</b>	<b>\$4,935.38</b>	<b>\$16,393.60</b>	<b>\$0.00</b>	<b>\$16,393.60</b>	<b>3.3</b>	<b>42,855</b>
ECM 6	Install VFDs on Hot Water Pumps	42,557	4.5	0.0	\$4,935.38	\$16,393.60	\$0.00	\$16,393.60	3.3	42,855

#### **ECM 6: Install VFDs on Hot Water Pumps**

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
42,557	4.5	0.0	\$4,935.38	\$16,393.60	\$0.00	\$16,393.60	3.3	42,855

#### *Measure Description*

We recommend installing a variable frequency drives (VFD) to control the space heating water pumps. This measure requires that a majority of the hot water coils be served by 2-way valves and that a differential pressure sensor is installed in the hot water loop. As the hot water valves close, the differential pressure increases. The VFD modulates pump speed to maintain a differential pressure setpoint. Energy savings results from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

## 4.1.5 Gas-Fired Heating System Replacements

Our recommendations for gas-fired heating system replacements are summarized in Figure 20 below.

*Figure 20 - Summary of Gas-Fired Heating Replacement ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Gas Heating (HVAC/Process) Replacement</b>		<b>0</b>	<b>0.0</b>	<b>994.7</b>	<b>\$9,840.06</b>	<b>\$184,109.73</b>	<b>\$0.00</b>	<b>\$184,109.73</b>	<b>18.7</b>	<b>116,465</b>
ECM 7	Install High Efficiency Hot Water Boilers	0	0.0	994.7	\$9,840.06	\$184,109.73	\$0.00	\$184,109.73	18.7	116,465

### ECM 7: Install High Efficiency Hot Water Boilers

#### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
0	0.0	994.7	\$9,840.06	\$184,109.73	\$0.00	\$184,109.73	18.7	116,465

#### *Measure Description*

We recommend replacing older inefficient hot water boilers with high efficiency hot water boilers. Boilers 1 and 2 are both more than 50 years old. They are clearly past their rated useful lifetime and should be replaced.

Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers were only evaluated when the return water temperature is less than 130°F during most of the operating hours. As a result, condensing hydronic boilers are recommended for this site.

We have estimated the costs and savings for this measure based on in-kind replacement. However, additional savings is often possible by installing multiple staged hydronic boilers rather than a single large boiler. Care should be taken to size new boilers appropriately, as operational conditions may have changed since the original boilers were installed.

## 4.1.6 Domestic Water Heating Upgrade

Our recommendations for domestic water heating upgrades are summarized in Figure 21 below.

*Figure 21-Summary of Domestic Water Heater ECMs*

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>	<b>0</b>	<b>0.0</b>	<b>53.0</b>	<b>\$524.74</b>	<b>\$11,500.21</b>	<b>\$398.00</b>	<b>\$11,102.21</b>	<b>21.2</b>	<b>6,211</b>
ECM 8   Install High Efficiency Gas Water Heater	0	0.0	53.0	\$524.74	\$11,500.21	\$398.00	\$11,102.21	21.2	6,211

### ECM 8: Install High Efficiency Gas Water Heater

#### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
0	0.0	53.0	\$524.74	\$11,500.21	\$398.00	\$11,102.21	21.2	6,211

#### *Measure Description*

We recommend replacing the existing tank water heater with a high efficiency tank water heater. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature.



### 4.1.7 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure 22 below.

*Figure 22-- Summary of Plug Load Equipment Control ECMs*

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Plug Load Equipment Control - Vending Machine</b>	<b>3,909</b>	<b>0.0</b>	<b>0.0</b>	<b>\$453.29</b>	<b>\$920.00</b>	<b>\$0.00</b>	<b>\$920.00</b>	<b>2.0</b>	<b>3,936</b>
ECM 9   Vending Machine Control	3,909	0.0	0.0	\$453.29	\$920.00	\$0.00	\$920.00	2.0	3,936

### ECM 9: Vending Machine Control

#### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
3,909	0.0	0.0	\$453.29	\$920.00	\$0.00	\$920.00	2.0	3,936

#### *Measure Description*

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

## 4.2 ECMs Evaluated But Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

**Figure 23 – Summary of Measures Evaluated, But Not Recommended**

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>	<b>0</b>	<b>0.0</b>	<b>53.0</b>	<b>\$524.74</b>	<b>\$11,500.21</b>	<b>\$398.00</b>	<b>\$11,102.21</b>	<b>21.2</b>	<b>6,211</b>
Install High Efficiency Gas Water Heater	0	0.0	53.0	\$524.74	\$11,500.21	\$398.00	\$11,102.21	21.2	6,211
<b>TOTALS</b>	<b>0</b>	<b>0.0</b>	<b>53.0</b>	<b>\$524.74</b>	<b>\$11,500.21</b>	<b>\$398.00</b>	<b>\$11,102.21</b>	<b>21.2</b>	<b>6,211</b>

\* - All incentives presented in this table are based on N.J. Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

\*\* - Simple Payback Period is based on net measure costs (i.e. after incentives).

### Install High Efficiency Gas Water Heater

#### Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
0	0.0	53.0	\$524.74	\$11,500.21	\$398.00	\$11,102.21	21.2	6,211

#### Measure Description

We evaluated replacing the existing tank water heater with a high efficiency tank water heater. Improvements in combustion efficiency and reductions in heat losses have improved the overall efficiency of storage water heaters. Energy savings results from using less gas to heat water, due to higher unit efficiency, and fewer run hours to maintain the tank water temperature.

#### Reasons for not Recommending

This ECM was deemed to be not a “high priority” measure, because of its relatively long payback, compared to the equipment’s rated useful lifetime. There would be some additional savings if this measure were implemented too, but it is not quite as cost-effective as the other ECMs, nor is the equipment in dire need of replacement (as with the two 51 year old main boilers).

## **5 ENERGY EFFICIENT BEST PRACTICES**

---

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. The recommendations below are for informational purposes only and do not reflect actual efforts actively being performed by Brick Township Board of Education.

### **Reduce Air Leakage**

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

### **Close Doors and Windows**

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

### **Ensure Lighting Controls Are Operating Properly**

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

### **Use Fans to Reduce Cooling Load**

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

### **Practice Proper Use of Thermostat Schedules and Temperature Resets**

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

## **Clean Evaporator/Condenser Coils on AC Systems**

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

## **Perform Proper Boiler Maintenance**

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

## **Perform Proper Water Heater Maintenance**

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three to four years old have a technician inspect the sacrificial anode annually.

## **Plug Load Controls**

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practices Guide" <http://www.advancedbuildings.net/plug-load-best-practices-guide-offices>.

## **Replace Computer Monitors**

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

## **Water Conservation**

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (<http://www3.epa.gov/watersense/products>) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gpf and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

## 6 ON-SITE GENERATION MEASURES

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

### 6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

On October 30, 2015, Brick Township Board of Education entered into a long-term solar power purchase agreement (PPA) with GeoPeak Energy, LLC. According to the terms of the PPA, GeoPeak will install rooftop solar arrays on seven Brick Township schools, including a 329 kW PV solar array at Lake Riviera Middle School. Brick BOE has agreed to purchase the electric output of the solar arrays at a specified rate (as detailed in the PPA) over the next 20 years.

Installation of the solar array at Lake Riviera Middle School was on-going during TRC's inspection of the facility, though purchases of the array's electric output had not yet begun.

*Image 8: School's rooftop before and after solar PV installation*



The first image above shows an aerial view of the school (from Google Maps) prior to installation of the solar array. The second image (from the PPA with GeoPeak, LLC) shows the proposed layout of the installed solar array. The image shows that most of the unshaded flat roof space has already been developed for solar electric generation, though not every rooftop area. So, some expansion of the solar array might be possible in the future to include additional rooftop areas. However, because an agreement for solar development of the building's rooftop is already in place, no additional analysis was deemed to be necessary for on-site generation potential at the facility.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ:** <http://www.njcleanenergy.com/whysolar>
- **NJ Solar Market FAQs:** <http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs>
- **Approved Solar Installers in the NJ Market:** [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved\\_vendorsearch/?id=60&start=1](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1)



## 7 DEMAND RESPONSE

---

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (<http://www.pjm.com/markets-and-operations/demand-response/csps.aspx>). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (<http://www.pjm.com/training/training%20material.aspx>), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.



## 8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 24 for a list of the eligible programs identified for each recommended ECM.

*Figure 24 - ECM Incentive Program Eligibility*

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Install LED Fixtures	X			X
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers				X
ECM 3	Retrofit Fixtures with LED Lamps	X			X
ECM 4	Install Occupancy Sensor Lighting Controls	X			X
ECM 5	Premium Efficiency Motors				X
ECM 6	Install VFDs on Hot Water Pumps				X
ECM 7	Install High Efficiency Hot Water Boilers	X			X
ECM 8	Vending Machine Control	X			X

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a “whole-building” energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey’s largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity’s annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci)

## 8.1 SmartStart

### Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

### **Equipment with Prescriptive Incentives Currently Available:**

*Electric Chillers*

*Electric Unitary HVAC*

*Gas Cooling*

*Gas Heating*

*Gas Water Heating*

*Ground Source Heat Pumps*

*Lighting*

*Lighting Controls*

*Refrigeration Doors*

*Refrigeration Controls*

*Refrigerator/Freezer Motors*

*Food Service Equipment*

*Variable Frequency Drives*

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

### Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom Measure incentives are calculated at \$0.16/kWh and \$1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one year payback (whichever is less). Program incentives are capped at \$500,000 per electric account and \$500,000 per natural gas account, per fiscal year.

### How to Participate

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: [www.njcleanenergy.com/SSB](http://www.njcleanenergy.com/SSB).

## 8.2 Pay for Performance - Existing Buildings

### Overview

The Pay for Performance – Existing Buildings (P4P EB) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is a generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also utilize the P4P program.

### Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from \$0.18-\$0.22/kWh and \$1.80-\$2.50/therm, capped at the lesser of 50% total project cost, or \$1 million per electric account and \$1 million per natural gas account, per fiscal year, not to exceed \$2 million per project. An incentive of \$0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

### How to Participate

To participate in the P4B EB program you will need to contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: [www.njcleanenergy.com/P4P](http://www.njcleanenergy.com/P4P).

### 8.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

- (1) Use an Energy Services Company or "ESCO."
- (2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
- (3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at:

[www.njcleanenergy.com/ESIP](http://www.njcleanenergy.com/ESIP).

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

## 8.4 Demand Response Energy Aggregator

The first step toward participation in a Demand Response (DR) program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (<http://www.pjm.com/markets-and-operations/demand-response/csps.aspx>). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (<http://www.pjm.com/training/training%20material.aspx>), along with a variety of other program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

## 9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

---

### 9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party (i.e. non-utility) energy supplier.

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).

### 9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).



# Appendix A: Equipment Inventory & Recommendations

## Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm #1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.09	182	0.0	\$21.13	\$234.00	\$40.00	9.18
Boiler Rm #1	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm #1	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,200	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	81	0.0	\$9.44	\$117.00	\$10.00	11.33
Boiler Rm #2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	91	0.0	\$10.56	\$117.00	\$20.00	9.18
Boiler Rm #3	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	91	0.0	\$10.56	\$117.00	\$20.00	9.18
Book Storage Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.05	115	0.0	\$13.35	\$233.00	\$40.00	14.46
Elevator Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.02	23	0.0	\$2.64	\$58.50	\$10.00	18.37
Server Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.04	91	0.0	\$10.56	\$117.00	\$20.00	9.18
Mop Storage Rm	1	Incandescent 60W Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,000	0.03	59	0.0	\$6.80	\$15.50	\$5.00	1.54
Walk-in Freezer	1	Incandescent 60W Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,000	0.03	59	0.0	\$6.80	\$15.50	\$5.00	1.54
Walk-in Cooler	1	Incandescent 60W Bulbs	Wall Switch	60	1,000	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,000	0.03	59	0.0	\$6.80	\$15.50	\$5.00	1.54
Kitchen	31	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	No	31	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.64	3,773	0.0	\$437.58	\$3,038.00	\$155.00	6.59
Kitchen Hood	5	Incandescent 60W Bulbs	Wall Switch	60	1,000	Relamp	No	5	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	1,000	0.17	293	0.0	\$34.01	\$77.50	\$25.00	1.54
Pantry	2	Incandescent 60W Bulbs	Wall Switch	60	2,000	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	1,400	0.07	247	0.0	\$28.65	\$147.00	\$30.00	4.08
Kitchen Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.03	161	0.0	\$18.69	\$174.50	\$10.00	8.80
Cafeteria	60	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	60	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	1.64	9,668	0.0	\$1,121.17	\$4,860.00	\$775.00	3.64
Cafeteria	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Multi-Purpose Rm	16	Metal Halide: (1) 250W Lamp	Wall Switch	295	3,360	Fixture Replacement	Yes	16	LED - Fixtures: High-Bay	Occupancy Sensor	160	2,352	1.92	11,314	0.0	\$1,312.06	\$5,817.44	\$2,470.00	2.55
Multi-Purpose Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.04	255	0.0	\$29.58	\$117.00	\$20.00	3.28
Multi-Purpose Rm	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Stage	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,200	0.15	319	0.0	\$36.97	\$409.50	\$70.00	9.18
Stage	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Closet 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.09	91	0.0	\$10.56	\$234.00	\$40.00	18.37
Closet 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	600	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	600	0.09	91	0.0	\$10.56	\$234.00	\$40.00	18.37
Gym	26	Linear Fluorescent - T5: 4' T5 (28W) - 6L	Wall Switch	180	2,500	Relamp	Yes	26	LED - Linear Tubes: (6) 4' Lamps	Occupancy Sensor	87	1,750	2.03	8,903	0.0	\$1,032.45	\$4,299.81	\$885.00	3.31

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Gym	8	Linear Fluorescent - T5: 4' T5 (28W) - 4L	Wall Switch	120	2,500	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,750	0.42	1,826	0.0	\$211.78	\$1,031.07	\$195.00	3.95
Gym	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Locker Rm	18	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,352	0.42	2,493	0.0	\$289.16	\$2,304.00	\$160.00	7.41
Boys Locker Rm	1	Incandescent: 60W Bulbs	Wall Switch	60	3,360	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	3,360	0.03	197	0.0	\$22.85	\$15.50	\$5.00	0.46
Boys Restroom	3	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	1,600	Relamp	Yes	3	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,120	0.04	103	0.0	\$11.97	\$376.73	\$20.00	29.80
Boys Gym Office	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,600	Relamp & Reballast	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.05	132	0.0	\$15.30	\$312.00	\$30.00	18.43
Gym Office Restroom	2	Incandescent: 60W Bulbs	Wall Switch	60	1,200	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	840	0.07	148	0.0	\$17.19	\$147.00	\$30.00	6.81
Gym Office Restroom	1	Compact Fluorescent: 2x 13W CFL Bulbs	Wall Switch	26	1,200	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	18	840	0.01	18	0.0	\$2.14	\$18.00	\$0.00	8.39
Gym Office Restroom	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	1,200	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	840	0.01	26	0.0	\$2.99	\$202.91	\$20.00	61.12
Girls Locker Rm	18	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,352	0.42	2,493	0.0	\$289.16	\$2,304.00	\$160.00	7.41
Girls Locker Rm	1	Incandescent: 60W Bulbs	Wall Switch	60	3,360	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	3,360	0.03	197	0.0	\$22.85	\$15.50	\$5.00	0.46
Girls Restroom	3	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	1,600	Relamp	Yes	3	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,120	0.04	103	0.0	\$11.97	\$376.73	\$20.00	29.80
Girls Gym Office	2	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	1,600	Relamp & Reballast	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,120	0.05	132	0.0	\$15.30	\$312.00	\$30.00	18.43
Gym Office Restroom	2	Incandescent: 60W Bulbs	Wall Switch	60	1,200	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	840	0.07	148	0.0	\$17.19	\$147.00	\$30.00	6.81
Gym Office Restroom	1	Compact Fluorescent: 2x 13W CFL Bulbs	Wall Switch	26	1,200	Relamp	Yes	1	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	18	840	0.01	18	0.0	\$2.14	\$18.00	\$0.00	8.39
Gym Office Restroom	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	1,200	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	840	0.01	26	0.0	\$2.99	\$202.91	\$20.00	61.12
Library	53	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	Yes	53	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,352	2.55	15,032	0.0	\$1,743.23	\$6,392.07	\$1,235.00	2.96
Library Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.05	322	0.0	\$37.37	\$233.00	\$40.00	5.16
Library Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.05	322	0.0	\$37.37	\$233.00	\$40.00	5.16
Library Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,352	0.10	567	0.0	\$65.78	\$306.27	\$60.00	3.74
Rm 100	9	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	9	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.21	742	0.0	\$86.06	\$998.00	\$65.00	10.84
Rm 101	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 102	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 103	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 104	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 105	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.33	1,151	0.0	\$133.47	\$972.00	\$155.00	6.12
Rm 106	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.33	1,151	0.0	\$133.47	\$972.00	\$155.00	6.12
Rm 107	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 108	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 108 SG	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,600	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,120	0.24	675	0.0	\$78.31	\$591.67	\$120.00	6.02
Rm 109	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 110	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 111	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	\$104.91	\$916.20	\$125.00	7.54
Rm 112	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	\$104.91	\$916.20	\$125.00	7.54
Comp Rm 113	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.26	905	0.0	\$104.91	\$916.20	\$125.00	7.54
Rm 114	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.87	3,039	0.0	\$352.41	\$1,982.40	\$395.00	4.50
Rm 115	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.87	3,039	0.0	\$352.41	\$1,982.40	\$395.00	4.50
Rm 116	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.87	3,039	0.0	\$352.41	\$1,982.40	\$395.00	4.50
Rm 117	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.58	2,026	0.0	\$234.94	\$1,411.60	\$275.00	4.84
Rm 118	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.67	2,363	0.0	\$274.09	\$1,601.87	\$315.00	4.70
Rm 118	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	96	0.0	\$11.12	\$174.50	\$30.00	12.99
1st Flr Connecting Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.32	1,139	0.0	\$132.03	\$877.50	\$150.00	5.51
GASP	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,000	0.07	242	0.0	\$28.01	\$215.40	\$30.00	6.62
GASP	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Excel	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,400	0.38	1,351	0.0	\$156.62	\$877.07	\$180.00	4.45
Boys Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Boys Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Girls Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Girls Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Stairwell 2	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.08	487	0.0	\$56.46	\$392.00	\$20.00	6.59

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 141	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 140	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 139	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 138	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 138A	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.27	959	0.0	\$111.23	\$855.00	\$135.00	6.47
Rm 137	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Lab Rm 136	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.68	2,398	0.0	\$278.07	\$2,002.50	\$320.00	6.05
Asst Principal Office	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,600	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,120	0.27	767	0.0	\$88.98	\$855.00	\$135.00	8.09
Stairwell 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.03	161	0.0	\$18.69	\$328.50	\$45.00	15.17
Stairwell 3	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	45	3,360	None	No	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	45	3,360	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Stairwell 3	3	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	35	3,360	None	No	3	LED - Fixtures: Ambient 2x2 Fixture	Wall Switch	35	3,360	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
2nd Flr End Hallway	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.02	128	0.0	\$14.79	\$58.50	\$10.00	3.28
2nd Flr End Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Rm 216	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 215	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 214	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 213	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 212	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Lab Rm 211	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.68	2,398	0.0	\$278.07	\$1,732.50	\$285.00	5.21
Rm 210	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 209	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 208	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 208 SG	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 207	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 206	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rm 205	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 204	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 203	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 202	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 201	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.41	1,439	0.0	\$166.84	\$1,147.50	\$185.00	5.77
Rm 200	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.27	959	0.0	\$111.23	\$701.00	\$120.00	5.22
Boys Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$504.00	\$75.00	9.64
Girls Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$504.00	\$75.00	9.64
Elevator	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.02	128	0.0	\$14.79	\$58.50	\$10.00	3.28
2nd Flr Conf Rm	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.27	959	0.0	\$111.23	\$701.00	\$120.00	5.22
2nd Flr Main Hallway	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.32	1,913	0.0	\$221.81	\$877.50	\$150.00	3.28
2nd Flr Main Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Mens Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Mens Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Womens Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Womens Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) 12" LED Circline Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Mens Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	96	0.0	\$11.12	\$174.50	\$10.00	14.79
Womens Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	96	0.0	\$11.12	\$174.50	\$10.00	14.79
Rm 200-A	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.02	82	0.0	\$9.56	\$214.00	\$5.00	21.86
Rm 200-B	12	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.28	989	0.0	\$114.75	\$1,446.00	\$95.00	11.77
Rm 200-C	12	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.28	989	0.0	\$114.75	\$1,446.00	\$95.00	11.77
Rm 200-D	1	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,400	0.02	82	0.0	\$9.56	\$214.00	\$5.00	21.86
Stairwell 1	4	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.08	487	0.0	\$56.46	\$392.00	\$20.00	6.59
Principal's Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.37	1,293	0.0	\$149.96	\$467.00	\$80.00	2.58
Principal's Restroom	2	Incandescent: 60W Bulbs	Wall Switch	60	2,000	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	1,400	0.07	247	0.0	\$28.65	\$147.00	\$30.00	4.08

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Main Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.49	2,896	0.0	\$335.90	\$738.00	\$115.00	1.85
Copy Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$350.00	\$60.00	6.52
Copy Rm 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	81	0.0	\$9.36	\$291.50	\$50.00	25.80
Closet 1	1	Compact Fluorescent: 17W CFL Bulbs	Wall Switch	17	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.01	7	0.0	\$0.85	\$15.50	\$0.00	18.16
Closet 1	1	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.03	47	0.0	\$5.44	\$15.50	\$5.00	1.93
Closet 2	1	Compact Fluorescent: 17W CFL Bulbs	Wall Switch	17	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.01	7	0.0	\$0.85	\$15.50	\$0.00	18.16
Closet 2	1	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.03	47	0.0	\$5.44	\$15.50	\$5.00	1.93
Student Services	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$291.50	\$50.00	7.24
Student Services Office 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.03	108	0.0	\$12.48	\$350.00	\$60.00	23.23
Student Services Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	54	0.0	\$6.24	\$233.00	\$40.00	30.92
Student Services Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	54	0.0	\$6.24	\$233.00	\$40.00	30.92
Special Services	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$350.00	\$60.00	6.52
Special Services Office 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	54	0.0	\$6.24	\$233.00	\$40.00	30.92
Special Services Office 2	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	54	0.0	\$6.24	\$233.00	\$40.00	30.92
Special Services Office 3	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.02	54	0.0	\$6.24	\$233.00	\$40.00	30.92
Nurse's Office	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,000	0.17	607	0.0	\$70.42	\$468.00	\$80.00	5.51
Nurse Restroom 1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	800	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	560	0.03	38	0.0	\$4.45	\$174.50	\$30.00	32.48
Nurse Restroom 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	800	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	560	0.03	38	0.0	\$4.45	\$174.50	\$30.00	32.48
Nurse's Closet 1	1	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.03	47	0.0	\$5.44	\$15.50	\$5.00	1.93
Nurse's Closet 2	1	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	No	1	LED Screw-In Lamps: 9W LED Bulbs	Wall Switch	9	800	0.03	47	0.0	\$5.44	\$15.50	\$5.00	1.93
Faculty Restroom 1	2	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	560	0.07	99	0.0	\$11.46	\$147.00	\$30.00	10.21
Faculty Restroom 2	2	Incandescent: 60W Bulbs	Wall Switch	60	800	Relamp	Yes	2	LED Screw-In Lamps: 9W LED Bulbs	Occupancy Sensor	9	560	0.07	99	0.0	\$11.46	\$147.00	\$30.00	10.21
Asst Principal's Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	\$22.25	\$233.00	\$40.00	8.68
AP Office #2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	\$22.25	\$233.00	\$40.00	8.68
1st Fir Main Hallway	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.69	4,080	0.0	\$473.20	\$1,872.00	\$320.00	3.28



Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
1st Flr Main Hallway	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Faculty Rm	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.55	1,940	0.0	\$224.93	\$796.50	\$125.00	2.99
Faculty Coat Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	800	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	560	0.06	86	0.0	\$10.00	\$174.50	\$10.00	16.45
Men's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	800	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	560	0.06	86	0.0	\$10.00	\$174.50	\$10.00	16.45
Women's Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	3,360	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.06	362	0.0	\$41.99	\$174.50	\$10.00	3.92
End of Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,360	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,360	0.26	1,530	0.0	\$177.45	\$601.60	\$120.00	2.71
End of Hallway	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$504.00	\$75.00	9.64
Girls Rm	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.11	384	0.0	\$44.49	\$504.00	\$75.00	9.64
1st Flr Hall (near Gym)	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.52	3,060	0.0	\$354.90	\$1,404.00	\$240.00	3.28
1st Flr Hall (near Gym)	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Trophy Case	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	32	3,000	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	None	15	3,000	0.01	60	0.0	\$7.00	\$35.90	\$5.00	4.41
Boys Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Boys Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) LED Circular Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Girls Rm	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.08	288	0.0	\$33.37	\$445.50	\$65.00	11.40
Girls Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) LED Circular Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Rm 119	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.92	3,233	0.0	\$374.89	\$1,147.50	\$185.00	2.57
Rm 120	27	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.21	727	0.0	\$84.26	\$2,119.50	\$340.00	21.12
Hallway (near MP Rm)	14	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Wall Switch	46	3,360	Relamp & Reballast	No	14	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,360	0.29	1,704	0.0	\$197.62	\$1,372.00	\$70.00	6.59
Hallway (near MP Rm)	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.02	128	0.0	\$14.79	\$58.50	\$10.00	3.28
Hallway (near Boiler Rm)	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.32	1,913	0.0	\$221.81	\$877.50	\$150.00	3.28
Hallway (near Boiler Rm)	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	\$22.25	\$387.00	\$20.00	16.50
Boys Rm	1	Compact Fluorescent: 23W CFL Bulbs	Wall Switch	23	2,000	Relamp	Yes	1	LED Screw-In Lamps: 15W LED Bulbs	Occupancy Sensor	15	1,400	0.01	29	0.0	\$3.33	\$26.75	\$0.00	8.02

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	\$22.25	\$387.00	\$20.00	16.50
Girls Rm	1	Circular Fluorescent - T9: 32W Circline Tubes	Wall Switch	32	2,000	Relamp	Yes	1	LED - Linear Tubes: (1) LED Circular Lamp	Occupancy Sensor	19	1,400	0.01	43	0.0	\$4.99	\$86.91	\$0.00	17.42
Rm 121	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.14	484	0.0	\$56.17	\$1,323.00	\$215.00	19.72
Storage Rm	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,200	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	840	0.03	58	0.0	\$6.67	\$174.50	\$30.00	21.65
Rm 124	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.61	2,155	0.0	\$249.93	\$701.00	\$120.00	2.32
Rm 125	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.61	2,155	0.0	\$249.93	\$701.00	\$120.00	2.32
Rm 125 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.12	431	0.0	\$49.99	\$233.00	\$40.00	3.86
Woodshop Rm 126	30	Linear Fluorescent - T12: 2' T12 (40W) - 1L	Wall Switch	46	2,000	Relamp & Reballast	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.51	1,773	0.0	\$205.65	\$4,320.00	\$405.00	19.04
Woodshop Rm 126	5	Incandescent: 60W Bulbs	None	60	1,200	Relamp	No	5	LED Screw-In Lamps: 9W LED Bulbs	None	9	1,200	0.17	352	0.0	\$40.81	\$77.50	\$25.00	1.29
Woodshop Rm 126	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Rm 127	18	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	2,000	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.14	484	0.0	\$56.17	\$1,323.00	\$215.00	19.72
3 Trophy Cases	3	Linear Fluorescent - T12: 2' T12 (20W) - 1L	None	25	3,000	Fixture Replacement	No	3	LED - Fixtures: Display Case Lighting	None	10	3,000	0.03	155	0.0	\$18.00	\$191.28	\$0.00	10.62
Back Foyer	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.25	1,450	0.0	\$168.18	\$642.50	\$110.00	3.17
Back Foyer	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.03	161	0.0	\$18.69	\$174.50	\$30.00	7.73
Boys Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.05	322	0.0	\$37.37	\$233.00	\$40.00	5.16
Girls Rm	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,360	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,352	0.05	322	0.0	\$37.37	\$233.00	\$40.00	5.16
Custodial Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,000	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,400	0.05	192	0.0	\$22.25	\$233.00	\$40.00	8.68
Front Door	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.10	756	0.0	\$87.62	\$333.79	\$100.00	2.67
Door 4A	2	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.33	2,508	0.0	\$290.90	\$781.35	\$200.00	2.00
Door 5	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.10	756	0.0	\$87.62	\$333.79	\$100.00	2.67
Door 9A	1	Compact Fluorescent: 23W CFL Bulbs	Wall Switch	23	4,380	Relamp	No	1	LED Screw-In Lamps: 15W LED Bulbs	Wall Switch	15	4,380	0.01	40	0.0	\$4.67	\$26.75	\$0.00	5.72
Door 11	1	Compact Fluorescent: 23W CFL Bulbs	Wall Switch	23	4,380	Relamp	No	1	LED Screw-In Lamps: 15W LED Bulbs	Wall Switch	15	4,380	0.01	40	0.0	\$4.67	\$26.75	\$0.00	5.72
Door 12	1	Compact Fluorescent: 23W CFL Bulbs	Wall Switch	23	4,380	Relamp	No	1	LED Screw-In Lamps: 15W LED Bulbs	Wall Switch	15	4,380	0.01	40	0.0	\$4.67	\$26.75	\$0.00	5.72
Door 13	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.09	725	0.0	\$84.12	\$390.68	\$100.00	3.46

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Door 15	1	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.16	1,254	0.0	\$145.45	\$390.68	\$100.00	2.00
Door 16	2	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.33	2,508	0.0	\$290.90	\$781.35	\$200.00	2.00
Door 17	1	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.16	1,254	0.0	\$145.45	\$390.68	\$100.00	2.00
Door 18	1	Compact Fluorescent: 23W CFL Bulbs	Wall Switch	23	4,380	Relamp	No	1	LED Screw-In Lamps: 15W LED Bulbs	Wall Switch	15	4,380	0.01	40	0.0	\$4.67	\$26.75	\$0.00	5.72
Door 21	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.10	756	0.0	\$87.62	\$333.79	\$100.00	2.67
Door 21A	1	Metal Halide: (1) 250W Lamp	Wall Switch	295	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	46	4,380	0.16	1,254	0.0	\$145.45	\$390.68	\$100.00	2.00
Door 22	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.10	756	0.0	\$87.62	\$333.79	\$100.00	2.67
Door 24	2	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.20	1,511	0.0	\$175.24	\$667.58	\$200.00	2.67
Door 25	1	Metal Halide: (1) 150W Lamp	Wall Switch	190	4,380	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Wall Switch	40	4,380	0.10	756	0.0	\$87.62	\$333.79	\$100.00	2.67
Parking Lot Poles	10	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	200	4,380	None	No	10	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Wall Switch	200	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Perimeter Wall	7	LED Screw-In Lamps: Wall-Wash Lights	Wall Switch	60	4,380	None	No	7	LED Screw-In Lamps: Wall-Wash Lights	Wall Switch	60	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Perimeter Wall	2	LED - Fixtures: Wall-Wash Lights	Wall Switch	60	4,380	None	No	2	LED - Fixtures: Wall-Wash Lights	Wall Switch	60	4,380	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

## Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm #1	Baseboard & Heating Coils	1	Heating Hot Water Pump	15.0	86.5%	No	3,391	Yes	93.0%	Yes	1	2.27	19,818	0.0	\$2,298.31	\$7,041.17	\$0.00	3.06
Boiler Rm #1	Baseboard & Heating Coils	1	Heating Hot Water Pump	15.0	86.5%	No	3,391	Yes	93.0%	Yes	1	2.27	19,818	0.0	\$2,298.31	\$7,041.17	\$0.00	3.06
Boiler Rm #2	Zone Hot Water Loop	1	Heating Hot Water Pump	5.0	85.5%	No	3,391	Yes	89.5%	Yes	1	0.73	6,594	0.0	\$764.69	\$4,076.22	\$0.00	5.33
Boiler Rm #3	Zone Heat Pumps	2	Heating Hot Water Pump	1.0	80.5%	No	3,391	Yes	85.5%	Yes	1	0.32	2,822	0.0	\$327.29	\$3,676.97	\$0.00	11.23
Boiler Rm #3	Boiler Circ Pump	2	Process Pump	0.2	80.0%	No	3,391	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm #1	Unit Ventilators	1	Air Compressor	2.0	82.0%	No	4,957	No	82.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Restrooms	Restrooms	12	Exhaust Fan	0.3	70.0%	No	1,200	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Gym	4	Exhaust Fan	0.5	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	School	3	Exhaust Fan	0.8	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Gym	1	Exhaust Fan	0.8	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Woodshop	1	Exhaust Fan	2.0	80.0%	No	1,000	No	80.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Kitchen	1	Kitchen Hood Exhaust Fan	2.0	84.0%	No	1,000	No	84.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm	AHU	1	Supply Fan	0.3	70.0%	No	2,745	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Cafeteria	2	Exhaust Fan	0.5	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	Kitchen	1	Process Fan	0.3	70.0%	No	600	No	70.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions										Energy Impact & Financial Analysis						
		System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Multi-Purpose Rm, Lobby	1	Packaged AC	8.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Cafeteria, Multi-Purpose Rm	1	Packaged AC	15.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	4	Ductless Mini-Split HP	3.00	36.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	2	Ductless Mini-Split HP	2.00	25.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	2	Ductless Mini-Split HP	1.00	12.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	2	Ductless Mini-Split HP	1.92	23.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	2	Ductless Mini-Split HP	1.50	19.00	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	8	Window AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	Classes, Offices	2	Window AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions								Energy Impact & Financial Analysis					
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm #1	Original Building	2	Non-Condensing Hot Water Boiler	5,021.25	Yes	2	Condensing Hot Water Boiler	5,021.25	93.00%	Ec	0.00	0	933.0	\$9,229.63	\$184,109.73	\$0.00	19.95
Boiler Rm #2	1996 Addition (6 Classrooms)	2	Non-Condensing Hot Water Boiler	127.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Boiler Rm #3	2002 Addition (2 Floors)	1	Non-Condensing Hot Water Boiler	720.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	RTU-1	1	Furnace	145.80	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	RTU-2	1	Furnace	218.70	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Rm #1	Main Building Restrooms + Kitchen	1	Storage Tank Water Heater (> 50 Gal)	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	95.00%	Et	0.00	0	65.7	\$649.79	\$11,500.21	\$398.00	17.09
Boiler Rm #3	Restrooms in 2002 Addition	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Walk-In Cooler/Freezer Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
	Cooler/Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Commercial Refrigerator/Freezer Inventory & Recommendations

Location	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Whole School	4	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Whole School	4	Stand-Up Refrigerator, Solid Door (≤15 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Freezer Chest	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	2	Refrigerator Chest	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Commercial Ice Maker Inventory & Recommendations

Location	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
	Quantity	Ice Maker Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Ice Making Head (<450 lbs/day), Batch	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Cooking Equipment Inventory & Recommendations

Location	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Equipment Type	High Efficiency Equipment?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Electric Large Vat Fryer	No	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00



### Dishwasher Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Under Counter (Low Temp)	Natural Gas	N/A	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00


### Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Whole School	161	Desktop Computers + Monitors	150.0	Yes
Whole School	5	Lg. Copy Machines	454.0	Yes
Whole School	12	Sm. Printers	28.0	Yes
Whole School	2	Server	600.0	No
Whole School	51	CRT TVs	150.0	No
Whole School	3	Flat TVs	65.0	Yes
Whole School	9	Microwaves	1,000.0	No
Whole School	2	Washers & Dryers	867.0	Yes

### Vending Machine Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Hall near Gym	1	Refrigerated	Yes	0.00	1,612	0.0	\$186.93	\$230.00	\$0.00	1.23
Hall near Gym	1	Non-Refrigerated	Yes	0.00	343	0.0	\$39.72	\$230.00	\$0.00	5.79
Faculty Rm	1	Refrigerated	Yes	0.00	1,612	0.0	\$186.93	\$230.00	\$0.00	1.23
Faculty Rm	1	Non-Refrigerated	Yes	0.00	343	0.0	\$39.72	\$230.00	\$0.00	5.79

## Appendix B: ENERGY STAR® Statement of Energy Performance



LEARN MORE AT [energystar.gov](http://energystar.gov)

# ENERGY STAR® Statement of Energy Performance

# 30

ENERGY STAR®  
Score<sup>1</sup>

### Lake Riviera Middle School

**Primary Property Type:** K-12 School  
**Gross Floor Area (ft<sup>2</sup>):** 129,208  
**Built:** 1966

**For Year Ending:** February 29, 2016  
**Date Generated:** August 30, 2017

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

#### Property & Contact Information

**Property Address**

Lake Riviera Middle School  
171 Beaverson Boulevard  
Brick, New Jersey 08723

**Property Owner**

Brick Township Board of Education  
101 Hendrickson Avenue  
Brick, NJ 08724  
(732) 785-3000

**Primary Contact**

James Edwards  
101 Hendrickson Avenue  
Brick, NJ 08724  
(732) 785-3000  
[jedwards@brickschools.org](mailto:jedwards@brickschools.org)

Property ID: 6013426

#### Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel		National Median Comparison	
79.5 kBtu/ft <sup>2</sup>	Electric - Grid (kBtu)	2,967,414 (29%)	National Median Site EUI (kBtu/ft <sup>2</sup> )	67.4
	Natural Gas (kBtu)	7,308,510 (71%)	National Median Source EUI (kBtu/ft <sup>2</sup> )	111.4
			% Diff from National Median Source EUI	18%
Source EUI	Annual Emissions			
131.5 kBtu/ft <sup>2</sup>	Greenhouse Gas Emissions (Metric Tons CO <sub>2</sub> e/year)		717	

#### Signature & Stamp of Verifying Professional

I \_\_\_\_\_ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Licensed Professional

\_\_\_\_\_  
,  
(\_\_\_\_)\_\_\_\_-\_\_\_\_  
\_\_\_\_\_



Professional Engineer Stamp  
(if applicable)